Clemson IMPACTS

Clemson University Public Service Activities

Summer 2005

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Letter from the Vice President

One of the founding principles of Clemson University was to improve the economic conditions of South Carolina. This emphasis is as important today as it was in Thomas Green Clemson's time more than 100 years ago.

Clemson public service personnel apply this principle every day through their research, Extension and regulatory programs. Their efforts are contributing to a stronger state economy by developing new knowledge, products and processes for agribusinesses and the life science industries; by preparing youth to participate in a knowledge-based economy; and by developing the potential of families and communities.

Through their work and your continuing support, Clemson will continue to improve the quality of life in South Carolina in the areas of agriculture and natural resources, economic and community development, food safety and nutrition, and youth development and families.

Of course, there isn't space in this newsletter to report all the work that Clemson public service personnel are doing; but I hope this issue will give you an overview of some of our efforts to make our state prosper as an even better place to live, work and raise a family.

Sincerely,

John W. Kelly

John W. Kelly
Vice President for Public Service and Agriculture

Knowledge for living. Knowledge for life.

CLEMSON PUBLIC SERVICE

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Germination box produces seedless watermelons

By Tom Lollis

Watermelon lovers are increasingly demanding that their melons be seedless and Clemson scientists are helping meet this need.

"The market is about 80 percent seedless right now," said Gilbert Miller, Extension vegetable specialist at Clemson's Edisto Research and Education Center in Blackville. "The Southeast is the only section of the country that still grows seeded melons for the market. Even so, about 70 percent of the melons produced in South Carolina are seedless."

Seedless melons must be planted from transplants, since warm conditions for germination are critical. Commercial germination rooms with precise controls for temperature and humidity can be expensive. However, Miller has developed a germination box for less than $60 that can produce enough transplants for three to five acres of melons.

The box is made from foam insulation, metal racks, a simple heater and two thermometers. A burlap bag soaked in water and placed on the floor maintains the high humidity necessary for germination. After germination the transplant trays are kept in a greenhouse for about 28 days before being planted in the field.

Gilbert Miller assembles a germination box he developed for seedless melons.

Watermelons are grown on around 11,000 acres across South Carolina, with an annual farm value of more than $7.5 million. Major commercial production is concentrated in the counties of Allendale, Bamberg, Barnwell, Colleton, Hampton and Chesterfield.

For more information: Gilbert Miller 803-284-3343, ext. 225, or gmllr@clemson.edu.

Dairy cattle advance breast cancer research

By Peter Kent

Research to prevent cancer is coming out of the barnyard. Breast cancer is all too common among the human population, but similar cancers are exceedingly rare in cattle, according to Steve Ellis, Clemson assistant professor in animal and veterinary sciences.

"Many mammary cancer cases in cattle wouldn't be widely reported, but in clinical terms mammary cancer in cattle is almost unheard of," said Ellis. "There are only a few dozen cases of bovine mammary cancer reported in the global scientific literature since 1902."

Whether the resistance to breast cancer among cattle is genetic or a side-benefit from the way that cattle digest fibrous feeds is unknown. However, understanding the physiology of breast cancer resistance in cattle could provide critical knowledge on the prevention of breast cancer in humans.

Ellis and his co-workers are studying the biology of mammary growth in cattle to improve profitability for dairy farmers. Their work could impact human breast cancer research as well.

For more information: Steve Ellis 864-656-6969 or ellis@clemson.edu.

"Sniffer" identifies cotton pest

By Tom Lollis

In science fiction, electronic sensors can detects all forms of life. At Clemson's Edisto Research and Education Center in Blackville, scientists are working to develop a real-world version of just such a sensor. The hand-held device may one day help farmers detect stink bug infestations in cotton, a pest that causes more than $50 million in U.S. crop losses annually.

The sensor, called the Cyranose 320, is currently used to sniff out drugs and explosives in airports. It routes air over a 32-sensor chip, where a chemical's signature is imprinted.

The Clemson research team, led by agricultural engineer Ahmad Khalilian, is working to identify chemicals given off by a cotton plant when bolls have been damaged by stink bugs. They are also investigating whether the sensor can be programmed to detect the pest directly.

"We hope to develop a hand-held device that a farmer can take to the field and measure the amount of stink bug infestation so decisions on pesticide applications can be made," Khalilian said.

Entomologist Sam Turnipseed said, "Over millions of years cotton has evolved to the point that it can make a chemical cry for help to predator insects when it is attacked by a pest such as the stink bug. A sniffer would make it possible to spray just the hot spots instead of the entire field."

Will Henderson, a Clemson master's student at Clemson, collects data on the chemicals given off by cotton plants.

Support for this project is provided by Cotton Incorporated, the S.C. Cotton Board, the Environmental Protection Agency and the Southern Region IPM Committee of USDA.

For more information: Ahmad Khalilian 803-284-3343, ext. 230 or akhlln@clemson.edu.

Lenders' school helps finance agriculture

By Tom Lollis

For 22 years, lenders who finance farming have been attending Clemson University's Southeast Agricultural Lenders School so they can better understand this highly competitive international arena.

"We don't teach bankers how to manage their banks, we teach them how to evaluate customers," said Johnny Jordan, school director. Classes emphasize leadership, planning, credit scoring, financial statement analysis and loan analysis.

More than 600 people have been trained by the school, the only one of its kind in the Southeast and one of only a few in the nation. Participants represent commercial banks, the Farm Credit system, the Farm Services Administration, agribusiness credit managers and bank auditors.

"Since the market is global now, lenders must be aware of the consequences of agricultural production, imports and exports in countries all over the world when evaluating the feasibility of a loan to a local farmer. By educating the bankers we can indirectly impact thousands of businesses and people involved in agriculture," Jordan said.

A graduate of the school is Andy Lowery, CEO of AgFirst, a major agricultural lender in the eastern United States and Puerto Rico. "I was in the course the first time they ever offered it," said Lowery. "It was very beneficial to me. We appreciate what Clemson does; the school is a great place for us to send young loan officers for training."

For more information: Johnny Jordan 864-656-2530 or jjordan@clemson.edu.

Partnership supports state shrimp industry

By Peter Kent

South Carolina shrimp were a big hit at the state Capitol during the Taste of South Carolina. Clemson and the S.C. Shrimpers Association served up shrimp and industry information to state leaders at the spring event.

"We brought 150 pounds of shrimp and came back with only a few pounds," said Jason Goins, Clemson Extension associate for the shrimp industry. Clemson researchers and Extension associates are working with South Carolina shrimpers to revive the industry, which has been devastated by cheap imported shrimp and a sluggish economy. Clemson Efforts include developing infrastructure support, quality assurance and marketing programs.

"Most everyone we spoke to about the current situation seemed to be concerned and in our corner," said Goins. "We feel it was a great success because we were able to provide information about the shrimp industry's standing and the steps that Clemson is taking to help improve it."

The event was organized by the Palmetto Agriculture and Food Industry Council to showcase the importance of the state's food and agriculture production industry. The shrimp industry was represented by Lonnie Golden, president of the S.C. Shrimpers Association, Clemson Extension associate Georgia Tisdale and Goins.

For more information: Jason Goins jgoins@clemson.edu or www.clemson.edu/sc-shrimp/

Architects unveil designs for Sandhill Center

By Debbie Dalhouse

One of the nation's leading architectural firms for "green construction" has designed new and renovated facilities for Clemson University's Sandhill Research and Education Center in Columbia. The designs include a conference center and offices to improve facilities that were originally built as an agricultural experiment station in the 1920s.

The Sandhill center houses Clemson's Institute for Economic and Community Development, which facilitates statewide collaborations to address the challenges faced by South Carolina communities.

"After a national competition the architectural firm Neal Prince + Partners (NP+P) of Greenville, SC, was selected to lead a collaborative team for the facilities design," said John W. Kelly, Clemson University vice president for public service and agriculture.

Partnering with NP+P is SmithGroup of Washington, DC, a firm that designed one of the first buildings in the nation to achieve the highest level certification in environmental sustainability, the platinum level of Leadership in Energy and Environmental Design (LEED). The LEED system is emerging as the new design standard because it emphasizes state-of-the-art strategies for sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

The conference center at Sandhill will be one of the first buildings in the nation to be used as an educational tool. The project will be used as a model of sustainable development for community leaders, state agencies, economic development teams and commercial developers from across the state, as well as for university students. Construction is planned to begin in early 2006 with completion projected for mid-2007.

For more information: Mac Horton mhorton@clemson.edu or www.clemson.edu/sand-hill/

Institute builds international partnerships for communities

By Kerry Coffey

Clemson models to build strong communities and protect children are going international. Mark Small, a psychologist in Clemson's Institute on Family and Neighborhood Life, shared information on the institute's Strong Communities initiative while serving as a Fulbright Scholar in the Czech Republic.

The Strong Communities initiative is the most comprehensive community effort in the United States for the prevention of child abuse and neglect. In addition to these workshops, Small worked with child researchers from Estonia, Hungary, and Slovakia to begin a study of multi-national indicators of child well-being. This study is funded by Childwatch International, a Norwegian organization.

As a direct outgrowth of his Fulbright experience, Small began the Palmetto Global Grantmakers Exchange Program in partnership with the Czech Donors Forum, the foremost organization in the Czech Republic for the development of community foundations. The exchange program provides local grantmakers with a global perspective on community development and allows foundation partners from around the world to benefit from the experiences of grantmakers in South Carolina.

"The struggle to build a better community is universal, so the more we can learn from one another, the more of an impact we can make on the quality of peoples' lives everywhere," said Small. "The exchange program has brought fresh ideas on fundraising and sustaining community projects to both sides of the Atlantic."

For more information: Mark Small msmall@clemson.edu or www.clemson.edu/ifnl/

Coastal consortium addresses stormwater issues

By Tom Lollis

Horry and Georgetown counties and municipalities have joined forces to tackle stormwater issues and maintain the quality of water resources in the coastal area.

This cooperative effort, called the Coastal Waccamaw Stormwater Education Consortium, addresses a regional need for minimizing polluted stormwater runoff.

"Population growth, residential and industrial development and resulting changes to the landscape have led to stormwater quality and quantity concerns in South Carolina," said Cal Sawyer, Clemson University Extension Service water quality coordinator.

Public education and involvement is a required component of a new EPA regulation on stormwater management. Clemson is joining other state institutions to provide a consistent stormwater education message for the coastal consortium.

Education partners include: Clemson University's Carolina Clear Program, Coastal Carolina University's Waccamaw Watershed Academy, North Inlet-Winyah Bay Estuarine Research Reserve's Coastal Training Program, the S.C. Sea Grant Extension Program, Murrells Inlet 2007 and the Waccamaw Riverkeeper.

"Continuing the coastal quality of life and the growth of our economy will depend on maintaining the quality of our water resources," said Susan Libes, professor of marine science at Coastal Carolina University.

"Efforts to educate the public on these issues are never-ending and a regional approach is the way to go," said Jeff Pollack, coordinator of the North Inlet-Winyah Bay Coastal Training Program.

For more information: Cal Sawyer 864-656-4072 or calvins@clemson.edu.

Scientists monitor for oak pathogen

By Peter Kent

A plant disease potentially as devastating as chestnut blight threatens Southeastern forests. Clemson University scientists and regulatory agents are monitoring nurseries, landscapes, and forests in South Carolina for Phytophthora ramorum, a fungus-like organism that causes sudden oak death.

The pathogen has killed thousands of oaks and associated plant species in the coastal forests of California and southwest Oregon as well as many ornamental plants in Europe.

"It's not a question of if the disease will come to the Southeast, it's when," said Steve Jeffers, Clemson plant pathologist and leader of the monitoring effort. "P. ramorum could cause the deaths of many trees throughout the Smokey Mountain region."

Researchers have found the pathogen in plants at two nurseries in Georgia, likely as a result of shipments from the West Coast. Sudden oak death was first observed in the U.S. in 1995 in California.

The pathogen spreads easily through nursery plants, as well as forest shrubs and trees, which are hosts for the disease. These include many popular Southern plants, such as camellias, rhododendrons, mountain laurels, viburnums, and andromeda.

For more information: Steve Jeffers at 864-656-7157 or sjffrs@clemson.edu.

4-H members enhance wildlife habitat

By Diane Palmer

A 4-H program is teaching youth ages 5-19 how to create food plots that benefit wildlife. Called Food and Cover Establishment for Wildlife, the program is an annual statewide contest co-sponsored by Clemson 4-H, the S.C. Department of Natural Resources (DNR) and S.C. Quail Unlimited.

"In this program youth learn about wildlife ecology, identification, behavior and management," said Rick Willey, Clemson Extension 4-H natural resources specialist. "They also learn about soil fertility, plant identification, hydrology, weather, farming techniques, record keeping, and life skills such as reading, writing, art, computers, math, photography, and recording data on maps, charts and graphs."

Each contestant keeps records on site preparation, fertilization, wildlife sightings and other observations from mid-June until mid-August. In the fall, plots and record books are judged on the county, regional and state levels by DNR wildlife biologists and technicians.

"This is an excellent opportunity for youths to participate in hands-on wildlife management, learn more about wildlife, and benefit wildlife populations all at the same time," said Jay Butfiloski, DNR wildlife biologist and statewide coordinator for the program. Last year, 4-H members in 32 counties participated in the contest.

For more information: Rick Willey 864-656-3090, rwlly@clemson.edu or www.clemson.edu/4H/Enviro/face.htm.

Pest management research aids SC and Asia

By Tom Lollis

Clemson scientists are part of an international effort to protect the environment and boost crop production through integrated pest management. The five-year program includes nine research partners and is funded by the U.S. Agency for International Development.

While the program is targeted for developing countries, half the grant funds will be used for research projects at Clemson that address problems faced by South Carolina farmers.

"Our focus will be on cocoa in the island of Sulawesi in Indonesia and vegetables on the island of Mindanao in the Philippines," said Merle Shepard, team leader and entomologist at Clemson's Coastal Research and Education Center in Charleston.

Sixty percent of the world's cocoa is produced in Indonesia, where a pest called the cocoa pod borer can cause 30 to 40 percent losses in yields. "More than 70,000 people in the United States are employed in the chocolate industry, so control of the borer has implications for them and for chocolate lovers as well," said Shepard.

Other Clemson team members include entomologist Gerald Carner and agricultural economist Mike Hammig.

For more information: Merle Shepard 843-402-5398 or mshprd@clemson.edu.

Collaboration harnesses enzymes to enhance nutrition

By Peter Kent

Merging the benefits of diet with pharmaceuticals and genomics has created a rapidly growing global business in nutrition. Clemson is taking the lead to expand South Carolina's economy in this expanding industry.

Clemson has formed a partnership with Diversa Corporation of San Diego, CA, to develop enzymes with the potential to enhance human nutrition. Researchers will initially evaluate the ability of adding protein supplements to food to improve stamina and alertness and reduce fatigue.

Jay Short, Diversa president, and John Kelly, Clemson vice president for public service and agriculture, sign a nutrition research agreement.

"Diversa's strengths in discovering and optimizing novel proteins are highly complementary to Clemson's research capabilities to rapidly test and develop new nutraceutical compounds," said David Gangemi, director of Clemson's Institute of Nutraceutical Research.

Jay M. Short, president of Diversa, said, "Clemson University and the Institute of Nutraceutical Research have developed impressive capabilities to accelerate the practical deployment of new technology aimed at improving human nutrition. The institute's ability to organize and run clinical testing programs and their established packaging and formulation expertise will help bring novel protein solutions to the consumer in a rapid, effective, safe and economical process.

Karl Kelly, CEO of SC Bio, the state's biotechnology incubator, said, "We believe this type of alliance will be pivotal in advancing research and creating new commercial avenues for South Carolina technologies."

For more information: David Gangemi, 864-656-6463 or gangemj@clemson.edu.

New food pyramid gets personal

By Diane Palmer

The new USDA Food Guide Pyramid includes a figure climbing up the side as a subtle suggestion that Americans should get off the couch and get moving if they want to slim down.

"For the first time, the pyramid includes recommendations for physical activity," said Katherine Cason, Clemson food scientist. "Food is still categorized by food groups, but how much of each food group you should eat depends on your age, gender, activity level and how many calories you need for a healthy weight."

The USDA developed the new food guide and slogan, "Steps to a Healthier You," to combat the growing problems of obesity, poor nutrition and lack of fitness for many Americans. The new guide suggests a diet of grains, fruits, oils, milk, meat and beans each day, but how much of each depends on your age, gender and activity level. Oils are included for the first time because research shows that vegetable oils and some fish oils contain fatty acids that are important for health.

"Many Americans can dramatically improve their overall health by making modest improvements to their diets and by incorporating regular physical activity into their daily lives," said Cason.

For more information: Katherine Cason kcason@clemson.edu or www.MyPyramid.gov.

Genetics, environment and diet all affect health

By Diane Palmer

Genetics, environment and diet may play an important role in good health, according to one of the nation's leading researchers in nutritional genomics. José Ordovas, director of the Nutrition and Genomics Laboratory at Tufts University, was the keynote speaker at the S.C. Alliance for Cancer Chemoprevention Symposium held at Clemson in May.

Ordovas believes that within a decade doctors will be able to take genetic profiles of their patients and make dietary recommendations to help them fight the diseases to which they are genetically prone. "Removal of the major disease risk factors will increase life expectancy worldwide by 9.3 years," Ordovas predicted.

The symposium is part of an ongoing effort to reduce the incidence, delay the onset and decrease the severity of cancer, especially in South Carolina, with an emphasis on nutrition, natural products and pharmaceutical chemistry.

Clemson's Institute of Nutraceutical Research, the University of South Carolina, the Medical University of South Carolina and the S.C. Research Authority make up the S. C. Nutrition Research Consortium, which co-sponsored the symposium.

"This work has enormous potential for the future of agriculture as we develop new crops for very specific dietary purposes," said David Gangemi, institute director. "Our vision is to provide an environment in which academia, government and industry can partner to promote nutraceuticals in mainstream American healthcare and to develop economic opportunities for rural communities in the state."

For more information: David Gangemi 864-656-6463 or gangemj@clemson.edu.

Chin-Fu Chen uses DNA microarray technology to study the molecular interaction of feverfew and white blood cells.

Feverfew research examines molecular connection

By Diane Palmer

Feverfew is an herbal medicine often used to treat migraine headaches but little is known of how it interacts with the body. Clemson University genomics researcher Chin-Fu Chen is seeking to answer those questions, with a grant from Phyto-Technologies, an Iowa-based herbal products company.

Chen is studying the effects of feverfew on white blood cells using new technology that combines functional genomics with bioinformatics. "Traditional methods in molecular biology generally work on a 'one gene in one experiment' basis," said Chen. "That means the output is very limited and it takes a long time to obtain the whole picture of gene function."

The new technology, called DNA microarray, allows Chen to speed up his research through diagnostic classification and prediction of a sample based on the gene expression profile. Using this technology, Chen can monitor 40,000 genes in the white blood cells at the same time and look for which set of genes would be responding to different abstracts or treatments. These genes will be correlated with the feverfew natural herb abstract.

Chen's research is in collaboration with Clemson's Institute for Nutraceutical Research. Other Clemson studies have shown that feverfew has great potential for commercial production in South Carolina. It can be produced using the same equipment and cultural practices as tobacco without the use of pesticides or herbicides.

For more information: Chin-Fu Chen 864-656-0748 or cchen@clemson.edu.

Program introduces top students to university

By Pam Bryant

Top high school students from three states are getting an early introduction to the university through a new program at Clemson's Youth Learning Institute in Pickens.

More than 2,000 academically talented students in ninth and tenth grade were recommended by high school guidance counselors in South Carolina, North Carolina and Georgia. Of those, 160 were selected for the program that began this spring.

Called C-CATS (Clemson's Challenge for Academically Talented Students), the program identifies the region's brightest students and challenges them to consider Clemson for their university studies. Each C-CATS weekend included activities focused on test-taking, memory enhancement and coherence. Admissions officers talked with the students about what it takes to get into selective universities such as Clemson; and the students participated in recreational activities including a bouldering cave.

"Students and their parents are becoming interested in the college selection process earlier in the high school career," said Robert Barkley, Clemson admissions director. "A program like C-CATS provides an opportunity for students to find out more about Clemson as well as the overall college selection process."

Extension programs provide financial education to youth

By Debbie Dalhouse

From 1990 to 1999, bankruptcies increased 51% among people under age 25, according to the National Endowment for Financial Education®. The good news is that as little as 10 hours of personal financial education can positively affect students' spending and saving habits, greatly improving their money management skills for a lifetime.

"Clemson Extension offers financial education programs for youth in all 46 counties of the state," said Nancy Porter, Clemson Extension family resource management specialist. Porter was named Financial Literacy Educator of the Year for 2004-2005 by the South Carolina Credit Union League for her work with high school students. Porter also has been recognized nationally for her leadership in a program for adults called "Financial Security in Later Life."

The High School Financial Planning Program® helps meet a state mandate that all public high school students must receive instruction in personal finance, financial planning, career choices, budgeting, savings and investments, credit and insurance. Since January 2000, this program has reached 72,745 South Carolina students.

Other financial education programs for youth include the Jump$tart Coalition speakers bureau, Mini-Society® entrepreneurial concepts for elementary school students, and Money My Way training for middle schoolers to turn a hobby into a business venture.

For more information: Nancy Porter 864-656-5718 or nporter@clemson.edu.

Summer camps teach and inspire

By Pam Bryant

Summer programs operated by Clemson's Youth Learning Institute (YLI) offer unique, hands-on learning in technology, marine science, wildlife, and 4-H camps for youth ages eight to 16.

"We believe summer camp is one of the most valuable experiences a child can ever have because they learn independence, responsibility, cooperation, teamwork, make life-long friends and create lasting memories," said Jorge Calzadilla, executive director of the institute.

This summer, the institute launched a new camp called The EDGE, which builds academic, physical and emotional stamina and teaches young people how to tap into and maintain peak performance at school, at home and at play. The 2005 camps include:

The EDGE – YLI education center in Pickens
Youth aged 10-14, use interactive tools that test their performance potential through intellectual, physical and group-based challenges.

Camp Voyager – YLI education center in Pickens
Campers aged 10-14 use Global Positioning Systems, Personal Digital Assistants, digital cameras and computers at this camp of the future.

Camp Sewee – Sewee Coastal Retreat Center near Mt. Pleasant
Campers aged 8-16 explore marine science and the South Carolina coast through island ecology studies, crabbing, kayaking, and nature hikes.

Camp Wildlife – Clinton House hunting lodge in Clinton
Campers aged 8-16 learn safety in shooting sports, sportsmanship and ethical behavior through a partnership with the S.C. Department of Natural Resources.

4-H Summer Camp – R.M. Cooper Center on Lake Marion
Campers aged 8-14 enhance self-esteem and self-reliance in a traditional camp environment that offers fishing, canoeing, archery, arts and crafts.

For more information: www.ylicamps.com or 864-878-1041.

Institute honored for contributions

By Kerry Coffey

The Institute on Family and Neighborhood Life has been recognized with numerous awards for generating, sharing, and applying knowledge to strengthen ties between families.

Institute director Gary Melton received his third award from the American Psychological Association's for Distinguished Contributions to the International Advancement of Psychology. He is only the second person to receive three such awards in the 113-year history of the association. In addition, he received the Research Career Achievement Award from the American Professional Society on the Abuse of Children.

Associate director Susan Limber was instrumental in earning two awards for programs to prevent bullying among school children. Her efforts with the Olweus Bullying Prevention Program resulted in a national Telly Award for the video, Sticks & Stones: the Truth about Bullying, and an Award of Excellence from the National Association of Government Communicators for public service announcements by the U.S. Department of Health and Human Services' program, "Take a Stand. Lend a Hand. Stop Bullying Now."

Faculty member James McDonell was honored as Researcher of the Year by The South Carolina Professional Society on the Abuse of Children for his work coordinating the institute's Strong Communities initiative, a child abuse and neglect prevention program.

For more information: Gary Melton gmelton@clemson.edu or www.clemson.edu/ifnl/.

Research honored by publishers

Clemson entomologist Peter H. Adler is a pioneer in the study of black flies who has conducted collaborative research projects on five continents in environments from Siberia to the Amazon Basin. His research has improved the ability to manage pest populations through programs from South Carolina to Europe.

Now, his work has been honored by the Association of American Publishers. The association's Professional and Scholarly Publishing Division named his book, The Black Flies (Simuliidae) of North America, the Best Single-Volume Reference in the Sciences for 2004. Adler co-authored the book with Douglas C. Currie of the University of Toronto and D. Monty Wood, research associate with Agriculture and Agri-Food Canada.

For more information: Peter Adler 864-656-5044 or padler@clemson.edu.

Living will forms available

Last spring the nation became aware of the tragedy that can result when a patient does not have a legal document stating their wishes for medical care if they are incapacitated. A "living will" sets forth your wishes for artificial nutrition, such as a feeding tube, in the case of terminal illness or a persistent vegetative state.

The two-page form and instructions are available at no charge from Clemson publications: www.clemson.edu/psapublishing/Pages/FYD/HM686.pdf

Innovative center develops flexible packaging

Flexible, pouch-style packaging is gaining popularity with industry and consumers, and Clemson University plays an important role in this fast-growing industry. In partnership with the packaging industry, Clemson has created the one-of-a-kind Center for Flexible Packaging.

The center teaches students new technologies, conducts research to develop advanced packaging materials and processes, and provides services to the packaging industry. Industry services include developing, evaluating and applying advanced flexible packaging materials.

"We also provide training and equipment demonstrations," said Robert Kimmel, center director. "We know of no other academic facility that offers such a broad range of capabilities."

Consumers are seeing more pouches as they shop for juices, cold cuts, snacks, tuna, frozen foods and pet foods. Restaurants, cafeterias, hospitals, institutions and households are showing a clear preference for pouch-type packaging. As a result, flexible packaging offers new and attractive business opportunities for packaging suppliers.

"Clemson's packaging science department has been instrumental in supporting several new South Carolina businesses using shelf-stable packaging," said Kimmel.

Clemson is one of only five universities in the nation that offer degrees in packaging science. More than 95 percent of the program's graduates are hired by the packaging industry.

For more information: Robert Kimmel 864-656-6534 or kimmel@clemson.edu.

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